

NOTES ON GENUS CALLIPHORA (DIPTERA).

CLASSIFICATION, SYNONYMY, DISTRIBUTION AND PHYLOGENY.

By G. H. HARDY.

(One Text-figure.)

[Read 31st March, 1937.]

The difficulties met in taxonomic study are responsible for considerable differences in the treatment of Australian species of *Calliphora*. Many promising studies have proved inadequate to meet the needs of the research worker, and although progress is being made in the study of details of morphology, so far there is no generally accepted scheme for their classification.

Actually the work was undertaken first by Johnston and Hardy in 1922, but hardly any progress could be made owing to the lack of a suitable method of treating the terminalia. The problem was taken up again in later years by myself, but in the meanwhile material had been sent to Malloch, resulting in a paper that the late E. W. Ferguson (These PROCEEDINGS, lii, 1927, p. xxiv) considered would solve the problem.

Some progress in the taxonomy of Australian Calliphoras was made in my paper of 1930, followed by another in 1932. The first of these brought considerable adverse comment at the time, but the attitude I had taken up in my treatment was subsequently acknowledged as leading somewhere. I do not think, however, that it was sufficiently recognized that the specific identities I had given rested largely on field observations which are difficult to set down in print. There were certain biological features arising from my studies, and I concluded that there are units in the Australian Calliphoras that cannot be isolated on terminalia alone, as far as yet known, but can be ascertained on colour and small structural characters that remain consistent for the species, not grading from one to another as at first would be supposed. These cases are represented by *C. rufipes* Macq. and *fallax* Hardy; by *C. augur* Fab. and *nociva* Hardy; by *C. tibialis* Macq. and *perida*, a new species described below. I have not found any area where the first two meet, but the distributions of the others overlap.

The arrangements of the species within this genus, given by Professor W. S. Patton (1935) and by myself, are at variance. Patton makes three main groups based on the type of terminalia the species exhibit. On the other hand, as will be seen below, this is not so very different from my arrangement, the differences lying mainly in the position where the dividing lines are to be drawn. The true relationship will be gathered when all features of the fly are considered phylogenetically, and I would be in agreement with Professor Patton if he were to limit his view on affinities and if he did not make the development of the terminalia cover the whole species. There can be no doubt that Professor Patton, in arranging his studies along the line he has taken, is making a very big step in advance in our understanding of terminalia, but it is my impression that he carries his conclusions to a stage that is a too liberal rendering of his discoveries. A comparison of our respective methods of classification is to be gathered in the following list, where I have marked with an asterisk (*) those species in which I have an intimate knowledge of terminalia. The list is only complete as far as

the subgenus *Proekon*. The remainder has been so confused in literature that I am unable at present to give a satisfactory account of the species concerned.

Subgenus *ADICHOSIA* Surcouf

ochracea-group.

**ochracea* Schiner

nigrithorax Malloch

Subgenus *CALLIPHORA* Desvoidy

erythrocephala-group

**cyrthrocephala* Meigen. (introduced)

These three sections form the *erythrocephala*-group of Patton.

Subgenus *NEOPOLLENIA* Brauer

stygia-group

**stygia* Fabricius

**australis* Boisduval

**laemica* White

canimicans-group

**canimicans* Hardy

**bezzii* Hardy

auriventris Malloch

Together with *fuscofemorata*, these two sections form the *canimicans*-group of Patton.

sternalis-group

**sternalis* Malloch

**deflexa* Hardy

rufipes-group

**rufipes* Macquart

**fallax* Hardy

**milleri*, n. sp.

**fulvicoxa* Hardy

sp. (from Western Australia)

Together with *australis* Malloch, these four sections form the *augur*-group of Patton.

Subgenus *PROEKON* Surcouf

augur-group

**augur* Fabricius

**nociva* Hardy

centralis-group

**centralis* Malloch

**falciformis* Hardy

macleayi Malloch

**fuscofemorata* Malloch

Forms not yet dealt with by Patton mostly come here, but probably would be placed in the *augur*-group by him, or some separated into another section, *canimicans*-group, or elsewhere.

Subgenus *ONESIA* Desvoidy

dispar Macquart

australis Malloch

and others

Key to groups and species in genus Calliphora

(combining Patton's leading discoveries).

1. Eyes hairy. Strut of aedeagus free.*	Ovipositor long. Abdomen yellowish.	ADICHOSIA.— <i>ochracea</i> -group	10
.....			
Eyes bare			2

* Patton states, under *ochracea*, that the strut is not free but "the end is attached to membrane". This must be an error, for on fresh material the struts will slip out of their membranous sockets quite readily, as in those of *stygia*.

2. Strut of aedeagus free. Ovipositor long	3
Strut of aedeagus fixed to other parts by membrane throughout its whole length.	
Ovipositor possibly always short	4
3. Blue species.	CALLIPHORA.— <i>erythrocephala</i> -group.
(One species only, <i>erythrocephala</i> Meigen, introduced.)	
Densely tomentose and hairy species; abdomen brown	
.....	NEOPOLLENIA.— <i>stygia</i> -group
4. Densely tomentose species; abdomen brown	5
Abdomen otherwise coloured	8
5. Without secondary plates on male terminalia	6
With secondary plates developed on male terminalia, these lying adjacent to accessory plates, closing the genital cavity. Ovipositor not examined	
.....	<i>sternalis</i> -group.
6. Strut reaching almost to apex of aedeagus which lies considerably to the rear of the strut. Ovipositor not examined	<i>canimicans</i> -group
Strut short in relation to the length of aedeagus so that the tip of the aedeagus (orifice) lies noticeably beyond the apex of the strut and almost in a line with it. Ovipositor short	7
7. Abdominal segment incorporated in the terminalia, of the typical broad type.	
Abdomen always with yellow hairs	<i>rufipes</i> -group
Abdominal segment incorporated in terminalia, of the narrow type (unique to group). Abdomen never with yellow hairs.	<i>tibialis</i> -group.
8. Abdomen mainly yellow with a blue central area on dorsum. Ovipositor short as far as known.	PROEKON.
Abdomen entirely blue, or rarely the last segment otherwise coloured	?ONESIA
9. Frons on female much wider than long. Two presutural acrostichal bristles only.	<i>augur</i> -group
Frons on female about as wide as long. Three presutural acrostichal bristles present	<i>centralis</i> -group

Subgenus ADICHOSIA.

10. Eyes on male almost contiguous. Thorax very densely covered with yellow, hiding the ground-colour	<i>ochracea</i> Schiner
Eyes on male widely separated, almost as wide as on female. Thorax with a very slight whitish covering not hiding the ground colour	<i>nigrithorax</i> Malloch

Subgenus NEOPOLLENIA.

11. On the male the facets of the eyes are enlarged on the upper area and hence the eyes are contiguous	12
On the male the facets of the eyes are not enlarged above and hence the eyes are conspicuously separated. Anterior clasper on male is exceptionally long at its base, thus being about as long there as high	<i>australis</i> Boisduval
12. Anterior clasper normal at its base, being shorter than high	<i>stygia</i> Fabricius
Anterior clasper long at its base, as in <i>australis</i> , being about as long there as its height	<i>laemica</i> White
13. Abdomen with yellow hairs	14
Abdomen without yellow hairs	<i>auriventris</i> Malloch
14. Strut of aedeagus, at centre, conspicuously bent forwards	<i>bezzii</i> Hardy
Strut of aedeagus very slightly bowed forward uniformly and without a marked bend	<i>canimicans</i> Hardy
15. Eyes of male separated by one-eighth the width of an eye. Legs slightly stained with black	<i>deflexa</i> Hardy
Eyes of the male separated by one-seventh the width of an eye. Legs with the coxae and femora entirely black	<i>sternalis</i> Malloch
16. Three presutural acrostichals present. Anterior coxae always yellow. Eyes of male separated by the width of two ocelli	<i>fulvithorax</i> Hardy
Only two presutural acrostichals present. Anterior coxae dark	17
17. Strut of aedeagus reaching only half-way towards the orifice	<i>milleri</i> , n. sp.
Strut of aedeagus reaching two-thirds the distance towards the orifice	18
18. Eyes of the male separated by the width of two ocelli	<i>fallax</i> Hardy
Eyes of the male separated by the width of only one ocellus	<i>rufipes</i> Macquart
19. Femora entirely black, tibiae more or less reddish-brown. All pleural hairs black	<i>tibialis</i> Macquart
Femora never entirely black, but brown and often more or less darkened over the basal half or two-thirds. Some pleural hairs yellow	<i>perida</i> , n. sp.

The synonymy of species in Neopollenia.

Malloch referred to ten species of *Neopollenia* in his papers, and his distinguishing characters are so unsatisfactory that I do not find it easy to determine their exact identity. Below I give the evidence on which I have placed his forms. Some are yet to be checked on Malloch's original material, none of which has come before me.

C. stygia.—Malloch apparently had a complex under this name, judging on localities alone, for the species is unknown from New Zealand. The locality from which he illustrates the terminalia is not given, but probably this was somewhere in eastern Australia. His second reference gives "Swan River"; that, if adequately identified, must be *C. australis*. Only one specimen of *C. stygia* has been captured in Western Australia, and this is recognized as being an abnormal occurrence. Malloch's third reference is without specified locality.

C. australis.—The name is definitely rejected by Malloch on the view that it is either a synonym of *stygia* or else unrecognizable.

C. fulvicoxa.—The name is accepted by Malloch, who admits having it confused under *hilli*.

C. rufipes.—This name is referred to in two places on the same page, the remarks being ambiguous. First, he proposed dropping the name in favour of his interpretation of *hilli*, which he erroneously claimed to be a well-established species; then he says the species was originally described from Java, and referred it to *Hemilucilia*, believing it to be not Australian. There is reason to suppose he did not examine the description of *Pollenia rufipes* Macquart, 1835, which is the reference of the Australian species, the Javanese one being put into another genus by its author.

Calliphora hilli Patton (nec Malloch).—It is advisable to state here that there is no evidence to support the view that Malloch had seen this species and Malloch's references must be placed elsewhere.

C. hilli Malloch (nec Patton).—This was possibly based originally on *C. fallax*, and, as his material included three females from Eungella (Queensland), I was able to recognize that these, at least, were probably *C. fulvicoxa*, which later Malloch admitted. However, he rejected the view that the other specimens he had were *C. fallax*. I have seen no material from his locality "Barrington Tops". Malloch's further reference to *C. hilli* occurring in New Zealand is also at fault, and I have given this a new name below.

C. auriventris Malloch.—Known from a single female from the Fly River district. The description being inadequate for its recognition, the name stands in abeyance. There is known to me only one species that conforms to Malloch's description, and the specimens are from Tasmania, suggesting that I have not identified the species with any degree of assurance. My own references under the name belong to the Tasmanian species, and the determination is probably erroneous.

C. sternalis Malloch.—I believe I have placed this species successfully. The only character of importance that Malloch gives concerns the ventral plate of the terminalia, the apical sternite being conspicuously lobed, otherwise the species would have been quite unrecognizable.

C. tibialis.—Doubtless there is some misunderstanding in the determination of this well-recognized species, with which the original description does not agree. Brauer referred it to *Neopollenia*, evidently relying on Schiner's determination, but Malloch states that Schiner has two species of *villosa* standing under the

name amongst his material. I have been very loath to accept the name as more than a provisional one. Patton has compared specimens with the type, and it is generally recognized under the name in Patton's sense. However, I have isolated one form, giving it the name *perida*. This new form, apparently limited to Queensland, could hardly have reached Macquart, and so the name seems warranted.

C. albifrontalis Malloch, 1932.—Regarded by me as being quite unrecognizable from description, but Tillyard records it as a synonym of *australis* (Tillyard and Seddon, Council Sci. and Ind. Res., Pamphl. 37, 1933, p. 11, footnote). Patton claims that it is identical with *fulvicoxa* after examining the terminalia. Malloch only had two males of it and Patton does not say if one of these formed the determination of genital characters, or some other material. However, as Patton's view so readily coincides with the description, I believe it must be correct.

C. varifrons Malloch, 1932.—This is another species unrecognizable from the description. Patton states it is *rufipes*, but there was only one male in Malloch's material and the description reads like *australis* in many respects. There is a form corresponding to *rufipes* in Western Australia, but this does not agree with Malloch's description and perhaps Patton has this form confused owing to Malloch's comparisons with his *hilli*. The name *varifrons* can have no specific standing at present, and any further data should be based on Malloch's holotype specimen, for it is quite conceivable that he has a complex in his material. At present the name stands hardly more than a *nomen nudum*, and at best refers to *australis* with only two aerostichals, a not uncommon occurrence in the *stygia*-group.

CALLIPHORA STYGIA Fab.

Musca stygia Fab. 1781; Wiedemann 1832.—*Calliphora stygia* Schiner 1868; Hardy 1930; Patton 1935.—*Calliphora villosa* Desvoidy 1830.

A fly normal to the south-eastern quarter of the Commonwealth, mainly the coastal region, including Tasmania, but also the sheep country of New South Wales and Queensland, and Sydney and Brisbane. One specimen only is known from Western Australia. It is well known to be associated with myasis, and occurs in its greatest density over the coastal region, including Adelaide and Melbourne.

CALLIPHORA AUSTRALIS Boisd.

Musca australis Boisduval 1835.—*Calliphora australis* Hardy 1930; Patton 1935.

Apparently this species is confined to Western Australia, where it is associated with myasis.

CALLIPHORA LAEMICA White.

Musca laemica White, Dieffenbach's Travels in New Zealand, ii, 1843, 291. (All New Zealand references to *stygia* must be referred here.)

As far as yet known, this species is limited to New Zealand where it is associated with myasis. I have other specimens, females only, from Norfolk Island which might possibly come here.

CALLIPHORA FULVICOXA Hardy.

Calliphora fulvicoxa Hardy 1930; Malloch 1932; Patton 1935.—*C. hilli* Malloch (nec Patton) in part, 1927.—*C. albifrontalis* Malloch 1932.

I have no personal knowledge of this occurring in Western Australia, but Patton recognized it in a form that he regards, probably quite correctly, as *albifrontalis*. It is common in the vicinity of Brisbane and Adelaide, showing it to be possibly a north-western species in contrast with the range of *C. rufipes*, the two meeting in Adelaide.

Little is known concerning the economy of this fly, but during experiments conducted by Miss Joan Cue, at the Queensland University, it was found to oviposit on carrion that had been retained several days, whereas *C. fallax* only oviposited in fresh carrion. It is unlikely that this fly will be found associated with myasis, as it is not normally reared from carrion and does not seem to be attracted to traps.

CALLIPHORA FALLAX Hardy.

Calliphora hilli Malloch (nec Patton), in part, 1927; and *in toto*, 1932.—*Calliphora fallax* Hardy 1930; Patton 1935.

This fly is only known definitely from Queensland and New South Wales, being mainly a coastal fly, but found also in the sheep country in both States, where it is associated with myasis.

CALLIPHORA RUFIPES Macquart.

Pollenia rufipes Macquart 1835.—*Calliphora rufipes* Hardy 1930; Patton 1935.—*Calliphora hilli* Patton 1927 (nec Malloch).

The type localities given under the two original descriptions are practically identical, a few miles only separating the recorded places, and I have material before me from both. It is the common blowfly of that neighbourhood. Specimens are before me from Tasmania, Victoria and South Australia, but from no other State. Probably this species is capable of association with myasis, but the records standing under the name *hilli* are likely to refer to *fallax*, on the mainland of Australia, for the present fly seems strictly limited to the coastal region and is likely to be found in the interior only as an occasional migrant.

CALLIPHORA MILLERI, n. sp.

Calliphora hilli Malloch (nec Patton), in part only, 1927.

This is the common blowfly of New Zealand that goes under the name *hilli*, and I am indebted to Dr. D. Miller for specimens. I also have seen his drawings of terminalia which show quite distinctive features, the most noticeable being a superabundance of bristles on the claspers, the more gently curved strut and the much longer part lying beyond that relative to its two allies in Australia. It is also distinguishable by the eyes being placed apart slightly in excess of that found on *rufipes*. It is only known from New Zealand, where it is associated with the myasis of sheep.

CALLIPHORA PERIDA, n. sp.

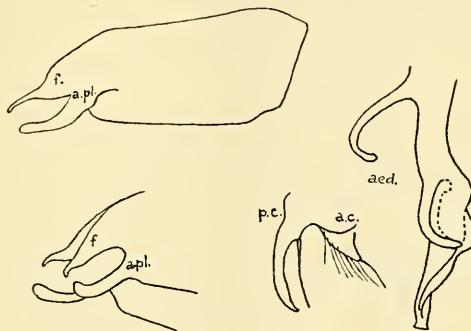
Closely related to *C. tibialis*, from which it may be distinguished by its brown femora, typically brown but often more or less darkened from the base to about half to two-thirds the length, being very variable in this respect. The only other feature of difference that has been noted is in the pleura and anterior coxae, both, or either, having yellow hairs, the number varying. No difference has been found in the terminalia or in the width between the very closely set eyes.

This fly is only known to me from Queensland, being quite plentiful around Brisbane, and occurs throughout the year, being associated during much of the winter and spring periods with the typical *C. tibialis*. However, between these two flies there is also a marked difference in habit, *perida* sporting on bushes whereas *tibialis* is strictly confined to the ground. Through all the years that I have been collecting and watching this fly and observing its habits, I have not found any actual joining up of the two distinguishing characters. When the

yellow pleural hairs are present, the femora are invariably brown in the main, whereas when no yellow hairs are to be seen, no brown is noted on the femora.

Hab.—Queensland. Brisbane; about 100 specimens are selected for the type series. Goondiwindi, 1 male.

Southern forms of the *tibialis* group also need close investigation, for I have specimens strongly suggesting that a complex occurs around Adelaide, and this



Calliphora perida, n. sp.—*acd.*, aedeagus; *a.c.*, anterior clasper; *p.c.*, posterior clasper; *f.*, forceps; *a.pl.*, accessory plate. Note the long narrow shape of the apical tergite; the lower figure shows the parts as seen on a mount, the forceps being broader than appears in the lateral view, when unmounted.

possibly new species may be extending towards Melbourne. I judge this from a long series taken in the two States concerned. From Sydney and from Tasmania I have seen only the typical form without marked variations.

CALLIPHORA AUGUR Fab.

Musca augur Fabricius 1775.—*Calliphora augur* Patton 1925, 1935; Hardy 1926, 1930; Malloch 1927 in part, and 1928 in part.

The synonymy that stands tentatively under this species is rather extensive and it is possible the names do not all belong to the one species. On the published evidence it is not possible to attach the names to any other species known to me.

The present species occurs in Tasmania, Victoria and perhaps in certain mountain areas of New South Wales as a permanent resident; it is also found in the southern coastal regions of Queensland and in the sheep country of the two latter States as a seasonal fly only. The limit of its western occurrence is not known. It is associated with myasis.

CALLIPHORA NOCIVA Hardy.

Calliphora augur Malloch 1927 and 1928 in part only, and many references in literature.—*Calliphora nociva* Hardy 1932; Patton 1935.

The permanent limits of this fly do not seem to extend eastward far beyond South Australia along the coastal region, but it is found in Melbourne and in Canberra. Its northern range includes Central Queensland, but apparently it does not enter the coastal region of this State, nor yet of New South Wales. It is associated with myasis. Possibly the fly is typical of the Mallee areas.

CALLIPHORA CENTRALIS Malloch.

Calliphora centralis Malloch, 1927; Hardy 1932; Patton 1935.

The range of this species is wide enough to suggest that an earlier name may be found for it. It apparently occurs through the coastal region of New South Wales, north of Sydney and far up into the Queensland coastal section. Normally it is confined to timbered country of the plains and low hills, and appears also to be a permanent resident in timbered districts of the western plains of Queensland, 300 miles inland at least. It is not attracted by carrion, nor yet caught in traps, as far as my experience goes.

CALLIPHORA FUSCOFEMORATA Malloch.

Calliphora fuscofemorata Malloch 1927.

I have a male of this species taken from very near the type locality (caught by Miss V. Irwin-Smith) and have examined its terminalia. It would appear to be a good species that cannot be confused with any earlier description. The form is only known from the northern parts of Queensland, probably confined to the rain-forest areas, just as *C. falciformis* Hardy may prove to be in the more southern rain-forest areas. Judging from its terminalia, Patton was quite correct in placing it with the *canimicans*-group in order to be consistent in his scheme of classification. In accordance with my key to species under genus *Proekon*, it goes into a new group characterized not only by the terminalia, but also in having two presutural acrostichal bristles and the blue metallic margin at apex of abdominal segments, but I list it for the time being in the *centralis*-complex; it does not agree with the definition of the group in the key given above.

Distribution.

The subgenus *Adichosia* is apparently limited to eastern Australia, and is represented by only two forms.

Neopollenia occurs in North Queensland, Norfolk Island, New Zealand, Tasmania, and Western Australia, which seem to mark the limits of distribution. South-eastern Australia and Tasmania are the areas of its greatest abundance.

Proekon is known from New Caledonia, Australia, Tasmania, and is recorded from Timor; it may even occur in New Guinea. Queensland is the area of its greatest abundance.

The coastal region of Australia, for the purpose of this account, may be divided into four quadrants, north-west, south-west, north-east and south-east.

The north-western quadrant is practically an unknown region in regard to Calliphoras as no systematic collecting has been done there. As seen below, it may possibly prove to be the centre of distribution for *C. fulvicoxa*. The south-western quadrant has been under investigation during recent years. The eastern side of Australia has been well covered and is best known.

The data given in this paper suggest that each quadrant has its own particular fauna in permanent residence, but is invaded periodically from some other region by species that are unable to become permanently established.

ADICHOEDIA.

This subgenus contains only two known species and is probably the most primitive of the Calliphoras. One species, *ochracea*, breeds throughout the year in the rain-forests within the north-eastern quadrant, and the other, *nigrithorax*, in similar conditions in the south-eastern quadrant. Elsewhere it appears to be a seasonal fly only.

NEOPOLLENIA.

The south-eastern quadrant has in permanent residence, *stygia*, *rufipes* and *tibialis*, three of the four first-described species. In addition, this is the only area in which *bezzii* and *deflexa* are known, and there are other species (Tasmanian) yet to be described. The north-eastern quadrant has *canimicans*, *sternalis*, *fallax* and *perida*. The south-western quadrant has *australis* and a species near *rufipes*. The north-western quadrant may possibly be the centre of the widely distributed *fulvicoxa*, for this is unknown from the south-eastern quadrant except at Adelaide, but is recorded from Perth and was described from Brisbane. But it might similarly be regarded as a Central Australian species which reaches the coast at the places mentioned.

PROEKON.

This subgenus has one species each in the south-western and the south-eastern quadrants, namely, *nociva* and *augur* respectively. The former extends its permanent range eastward to the border country of Victoria. All the other species known are practically limited to the north-eastern quadrant.

The two southern species may be breeding in different types of country, for *nociva* seems to favour the mallee areas, whereas *augur* occurs in the other wooded districts, the two meeting in the open plains.

Those species listed in the *centralis*-group and which are apparently restricted to the one quadrant, seem to show a tendency to definite regional distribution within that quadrant. The majority described and undescribed may be northern flies, but *centralis* seems to be typical of the open forest and *falciformis* of the rain forests, both occurring in the southern section of the quadrant.

PHYLOGENY.

Patton gives some phylogenetic ideas on the development of the terminalia, which seem to be quite sound in principle but reversed in direction of presumed development. Taking into account characters other than terminalia, it would seem that *Adichosia nigrithorax* would be the most primitive *Calliphora* extant, for it has hairy dichoptic eyes. The other species in the subgenus, also with hairy eyes, has the holoptic form; this also is the form towards which the other two subgenera trend. It seems to me probable that the terminalia of *Adichosia* may also be of the primitive type and should be placed at the base of the Calliphorine stem.

Patton, however, believes that the form of terminalia found on *augur* (*Proekon*) is the primitive one, and if this be the case we would have the curious incident of a primitive group being the one most abundant in species and the most advanced forms in the numerical minority. Also, the advanced form would have a restricted distribution, the primitive form a wide one.

Making the necessary adjustment, and accepting Patton's main theme, a diagram of phylogeny may be built up, as shown in the adjacent arrangement. I offer this diagram as a tentative one, but from data I have gathered by the study of other genera of the Calliphoridae, I think the general trend of the subject will be maintained. It may be shown that the ovipositor was originally long, and the strut developed from an independent thin support to become thickened and fused with other parts of the aedeagus later, the form taken in *canimicans* being an intermediate stage.

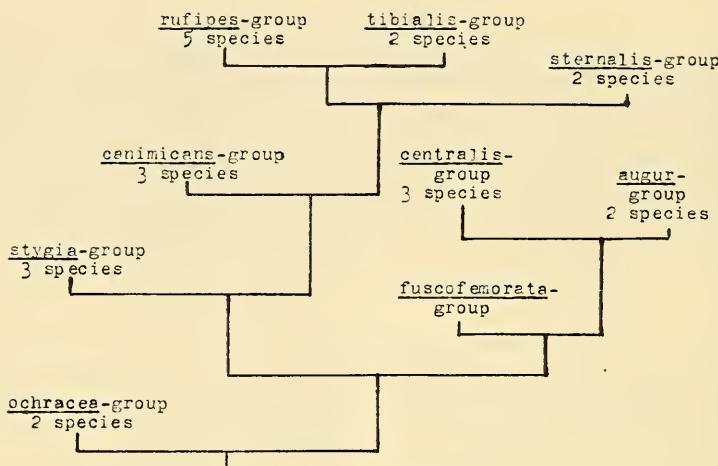


Diagram of Phylogeny.

Patton places the *sternalis*-group as associated with the *canimicans*-group for a reason unknown to me.

Key to the Phylogenetical Considerations.

1. Eyes hairy, primitively dichoptic at least in part. Strut free and slender. Ovipositor long *ochracea*-group
Eyes bare, the dichoptic nature strongly tends to disappear 2
2. Strut still free and slender and the ovipositor long *stygia*-group
Strut bound to other parts of aedeagus by membrane throughout its length. Ovipositor probably short in all cases or perhaps in some strongly tending that way 3
3. Strut still slender *canimicans*-group; *fuscofemorata*-group
Strut broadened 4
4. Strut normally broadened but curved at least at its apex; other characters of terminalia normal in general form 5
Strut abnormally broad and straight, only reduced at apex to a point not showing a marked trend forwards. Other parts of terminalia showing abnormal development at least in part, especially so in the development of secondary plates *sternalis*-group
5. Ninth tergite normal in breadth *rufipes*-group
Ninth tergite elongate relative to its breadth being markedly longer than broad *tibialis*-group

It will be noted that I use the name *fuscofemorata* for a group and place it in the above key and diagram. I do not expect the name to remain permanently, for the subgenus *Proekon* is not yet well understood. The *centralis*-group and the *augur*-group fall into alignment with the *rufipes*-group and there are none known to me within the subgenus *Proekon* that are comparable with the *tibialis*-group and the *sternalis*-group.

The subgenus *Onesia* stands in relation to *Neopollenia* very much as *Proekon* does, only it has more numerous species, some of which, like *fuscofemorata*, fall into alignment with the *canimicans*-group and some with the *ruficeps*-group. The introduced *erythrocephala*-group is in alignment with the *stygia*-group.

References.

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MALLOCH.—*PROC. LINN. SOC. N.S.W.*, iii, 1927, 299-335; iii, 1928, 598-617; and lvii, 1932, 64-8.